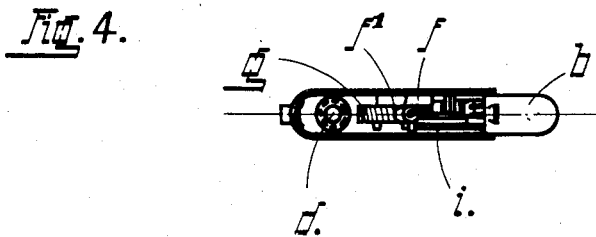
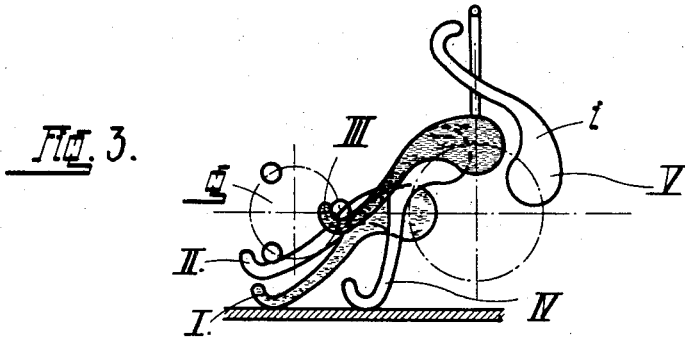
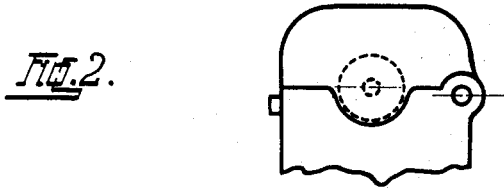
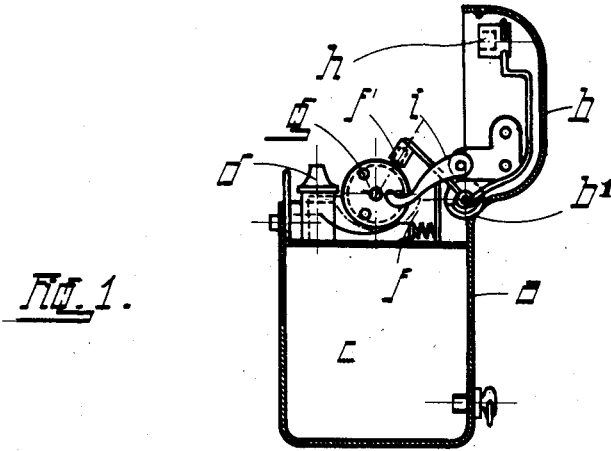


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FRICTION LIGHTER.

APPLICATION FILED JUNE 12, 1919. RENEWED AUG. 23, 1920.

1,359,003.

Patented Nov. 16, 1920.



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# UNITED STATES PATENT OFFICE.

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## FRICTION-LIGHTER.

1,359,003.

Specification of Letters Patent. Patented Nov. 16, 1920.

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To all whom it may concern:

Be it known that I, HERMANN THORENS, a citizen of the Swiss Republic, residing at Ste. Croix, Switzerland, have invented certain new and useful Improvements in Friction-Lighters, of which the following is a specification.

Friction lighters comprising a stone composed of a pyrophoric alloy against which there is rubbed the rough surface of a steel wheel actuated by a spring, are of two kinds differing from each other by the manner in which the spring acts upon the wheel.

In the first kind, a toothed sector fixed to the lid meshes with a pinion fixed to the wheel, and the effort of the spring is exerted upon the lid for the purpose of rotating the wheel. The necessary toothed gear is an undesirable source of resistance which requires a strong spring which is very advantageous.

In the second kind the wheel is fixed to a plate having a notch or slot in which engages a pin carrying the lid and driving the wheel each time the lid is opened by the spring.

Among the friction lighters of this last class, there are some (see Swiss Patent No. 54896) wherein, for the production of the spark, it is necessary that the relative motion between the part of the wheel and the pyrophoric element shall have reached a certain value. Now the resistance opposed by the friction of the above mentioned parts against each other, is a factor the importance of which is particularly apparent when the action of the spring is beginning and the inertia of the mechanism has yet to be overcome. The result is that if this fact is not taken into account, the wheel gets up its speed only gradually, and the commencement of the rotation constitutes a lost motion which causes misfires or weak sparks that do not insure the igniting of the saturated wick, comprised by those kinds of friction lighters.

This condition of affairs is remedied by employing, for starting the motion of the wheel, devices which do not act upon the latter until the other parts of the friction lighter which share the motion generated by the spring, have already stored up a certain momentum. The driving is therefore sudden, and a powerful spark is immediately produced without it being necessary to stress the spring unduly, thus preventing shocks

which end in throwing the entire mechanism out of order.

The improved friction lighter forming the subject matter of the present invention belongs by reason of its construction to neither of the hereinbefore mentioned classes, and in addition to the qualities of the second class, more particularly of the models of this class which take into account the difficulties of starting the mechanism, it affords advantages which constitute it a friction lighter that is more simple, more practical and of stronger construction than those hitherto known.

It is characterized by the feature that the lid is provided with a hook pivotally connected to it with considerable friction, and arranged, after the lid has begun its opening movement by the action of the spring, to engage under one of the various pins extending from the crown surface of the wheel for the purpose of rotating the said wheel suddenly; said pin being released by said hook when the lid is closed in order, by rocking around the pivot of the latter, to bear against a stop surface, and then to slide over said stop surface until the lid is closed.

A constructional form of the improved friction lighter according to this invention is illustrated by way of example in the accompanying drawings in which:—

Figure 1 shows it open, the front wall being removed.

Fig. 2 shows the apparatus closed, from the same side as that shown in Fig. 1.

Fig. 3 shows on a larger scale the various relative positions of the hook and the pins referred to in the opening statement.

Fig. 4 is a top plan view of the device with the lid raised.

Referring to the above mentioned drawings, *a* is a box to which a lid *b* is hinged, the greater portion of which is occupied by a reservoir *c* in which is immersed a wick (not shown), one of whose ends passes out through the burner *d*. This burner is removable and is composed of a nozzle prolonged by a split tube that has a slight spring action which is introduced into a short neck soldered to the top of the reservoir *c*.

This construction has the advantage of guiding the wick for a considerable length, so that when by reason of the want of petrol

this wick is unduly consumed, it will not fall back into the reservoir.

In removing the burner, the wick is removed with it, and then it can be pushed  
5 back to a useful length.

On the side shown in Fig. 1 there is soldered a bracket *f* formed in one piece with the top of the reservoir *c* in which is riveted an axle pin on which the wheel *g* can  
10 rotate freely. The bracket *f* is prolonged upwardly by an arm in a claw *f*<sup>1</sup> of which there is adapted to slide a pyrophoric stone pressed against the wheel by a straight end  
15 of a spring whose turns surround the axis of the hinge of the lid, and whose other end bears against the latter.

This spring works in torsion and has a tendency to keep the lid open, and it is prolonged inside the latter for maintenance of  
20 an extinguisher *h* which when the lid is closed, fits upon the burner *d*. A push stud is further provided for maintaining this closure. The hook *i* is pivotally connected with considerable friction to a part fixed to  
25 the lid. It is so arranged as to engage one of the three pins which are carried by the crown face of the wheel, and so as to move the said wheel at each opening of the lid. This drive is effected in the following manner.  
30

When the lid is closed and the spring is stressed, the hook (see Fig. 3) is in the position I. At the time of opening this hook moves (by virtue of the considerable friction  
35 of its pivotal connection) not around its own pivot, but around the axle pin of the lid as a center, and comes into the position II, in which it meets one of the pins of the wheel over which it first slides until it engages it with its nose, and then couples the  
40 wheel to the lid.

The stoppage of the latter constitutes also the stoppage of the wheel, and the parts are in the relative positions indicated at III.  
45

When the lid is closed again, the hook remains at first relatively to the latter the position which it occupied in its third stage still by virtue of the considerable friction of its  
50 pivotal connection, and it moves with the lid around the axle pin of the latter until it meets the upper portion of the reservoir (position IV) which forms here the stopping surface referred to in the opening  
55 statement, over which surface it slides and returns into the position I.

It will be seen that before the wheel is operated, all the other movable parts of the

apparatus will have acquired a certain speed. This has the result of producing a sudden and rapid rotation of the wheel, and  
60 although the latter rotates only through one third of a revolution at each operation, the spark is a powerful spark and the saturated wick is ignited with certainty.

Another advantage of the construction  
65 shown consists in the fact that all the parts of the friction lighter which are subject to wear can be replaced without the aid of any tool. As a matter of fact if, the lid being open, the lid be closed a little, the hook will  
70 become disengaged from the pin. Then on releasing the lid the latter rocks to the right so as to bring the hook into the position V (Fig. 3).

In this position the hook which was keeping  
75 the wheel in place on its axle, no longer prevents the removal of the wheel. The slot formed in the box allows of its replacement. On the other hand, the part *b'* of the lid abuts against the underside of the limb  
80 of the spring that bears upon the pyrophoric element and places the latter out of operation. In position V this limb occupies the position shown in Fig. 3, and allows an easy removal of the stone.  
85

What I claim is:—

In a pocket friction lighter, a box having a reservoir, a lid hinged to the box, a wick burner mounted in the box, a bracket extending upwardly from one side of the box,  
90 a roughened wheel rotatably mounted in the bracket, pins projecting from one face of the wheel, an arm continuing upwardly from the bracket and terminating in a holder, a pyrophoric stone in the holder, a spring surrounding the pivot of the lid hinge and having  
95 one arm bearing against the stone to hold the latter in yielding engagement with the periphery of the wheel, an extinguisher supported by the other arm of the spring and positioned within the lid, a plate secured to the lid and a hook arm pivotally  
100 connected with considerable friction to the plate for coacting with the pins to partially rotate the wheel upon opening of the lid and designed to slide on the top of the box upon the closing of the lid, and catch means releasably holding the lid closed.  
105

In testimony whereof I have signed my name to this specification.

HERMANN THORENS.

Witnesses:

ULYSSE CAMPICHE,  
FERNAND BERNEY.